



An Energy Efficiency Workshop & Exposition

Kansas City, Missouri

Biopower in Government Facilities: Current Reality and Potential

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June 5, 2001





Outline

- **Overview of Current Biomass Resource and Power Generation**
- **Growing Federal and State Interest in Biopower**
- **DOE Biopower Program Efforts Related to Federal and Public Sector**
- **Upcoming Events in Biopower and Information Resources**



- **Overview of Current Biomass Resource and Power Generation**

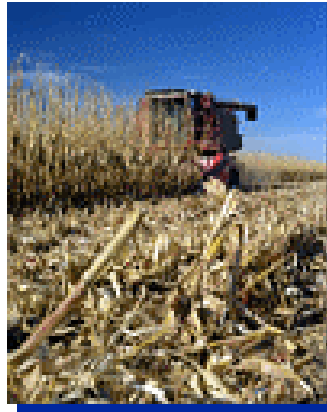


Biomass Resources – Prevalent and Widespread



Wood Residues

- Sawdust
- Wood chips
- Wood waste
 - pallets
 - crate discards
 - wood yard trimmings



Agricultural Residues

- Corn stover
- Rice hulls
- Sugarcane bagasse
- Animal waste

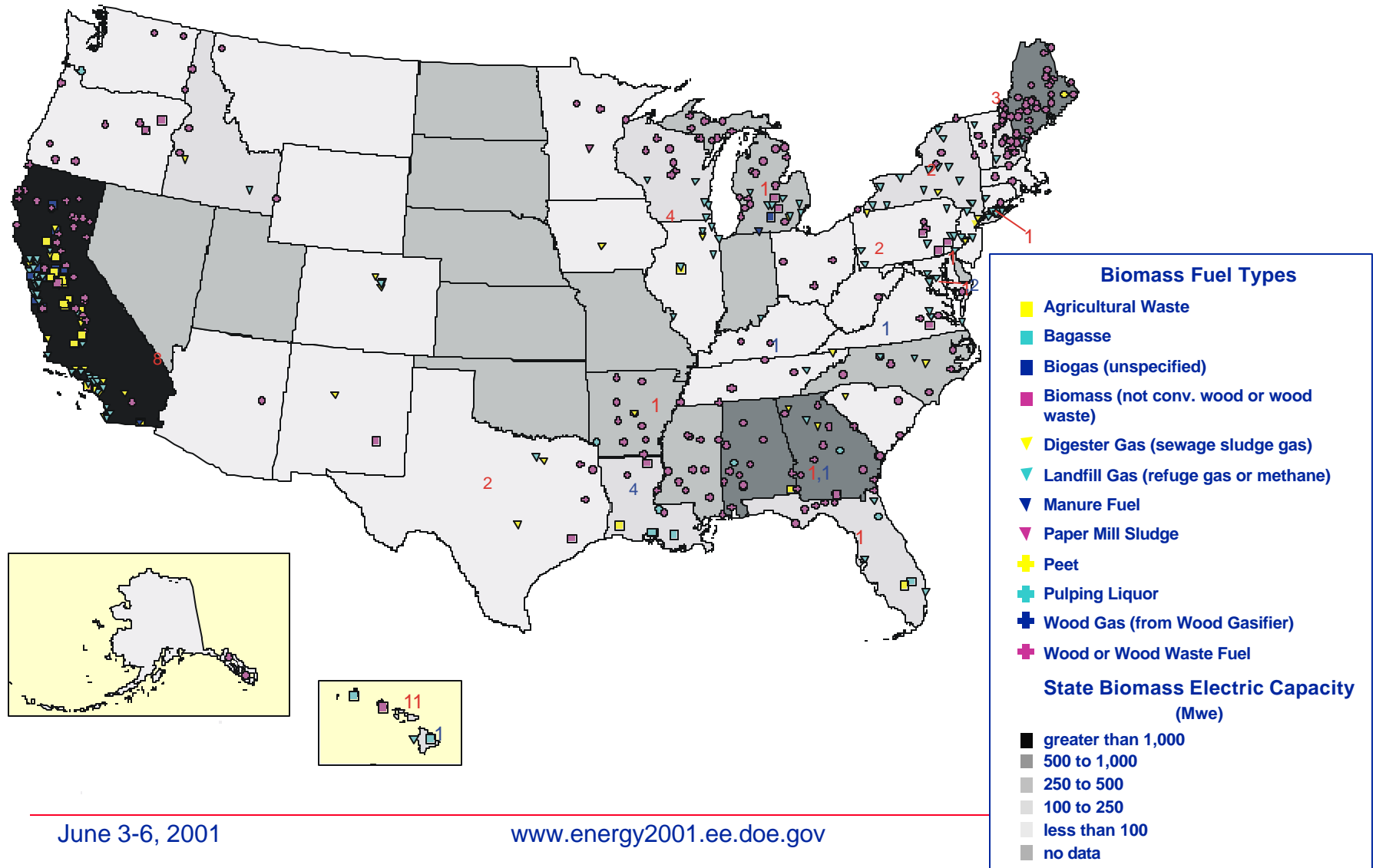


Energy Crops

- Hybrid poplar
- Switchgrass
- Willow



Biomass-Fired Power Plants



June 3-6, 2001

www.energy2001.ee.doe.gov

Biomass Power – “Clean” Energy Source



- Although combusted, biopower has many advantages as “clean” energy:
 - Landfill diversion
 - Wood fuels contain almost no sulphur
 - Can yield NO_x reductions up to 20%
 - Fuel diversity
 - Dispatchable on demand



- **Growing Federal and State Interest in Biopower**



Federal Interest in Energy Efficiency and Renewables

- **Federal government is the largest single user of energy in the U.S.**
 - Up to \$8 billion in annual energy-related purchases
- **Executive Order 13123, “Greening the Government through Efficient Energy Management...”**
 - Calls upon Federal agencies to purchase or generate green power (electricity generated from renewable energy sources such as solar, wind, geothermal, hydropower, and biomass)





Federal Interest in Bioenergy

- **Executive Order 13134 on Bioenergy and Biobased Products**
 - **Goal to triple U.S. use of biobased and bioenergy products by 2010**
 - **Led to formation of a Bioenergy Initiative comprised of DOE and 10 other Federal agencies**



Key Federal Partners



The Department of Energy
*- Science, Security and Energy:
Powering the 21st Century*



EPA United States
Environmental Protection Agency

"...to protect human health and to safeguard the natural environment..."



*Enabling the Nation's future through
discovery, learning and innovation*
The National Science Foundation



National Institute of Standards &
Technology
Department of Commerce



*to protect and provide access to our Nation's
natural and cultural heritage and honor our
trust responsibilities to tribes*
Department of the Interior



UNITED STATES DEPARTMENT OF
AGRICULTURE



**OFFICE OF THE FEDERAL
ENVIRONMENTAL EXECUTIVE**
*Task Force on Greening the Government
through Waste Prevention and Recycling*



The Office of Management and Budget



Office of Science and Technology Policy



The Department of the Treasury



The Power of the Public Good
Tennessee Valley Authority



Federal Interest in Bioenergy

- **Biomass R&D Act of 2000 (part of Agricultural Risk Protection Act, 2000)**
 - Major thrust is to improve cross-agency coordination and focus Federal R&D on the conversion of biomass into biobased industrial products
 - The Act authorized \$49 million and a Biomass R&D Interagency Board
 - A private sector link was established through a Technical Advisory Committee to advise R&D activities



Renewable Technologies and the States

- **State mandates will require additions of 5,065 MWe of renewable generating capacity from 2000 through 2020, including 4,377 MWe as a result of renewable portfolio standards:**
 - **2,900 MWe of wind capacity**
 - **1,985 MWe of landfill gas and biomass capacity**
 - **117 MWe of geothermal capacity**
 - **64 MWe of central station solar capacity**

Source: Energy Information Administration, Annual Energy Outlook 2001, December 2000.

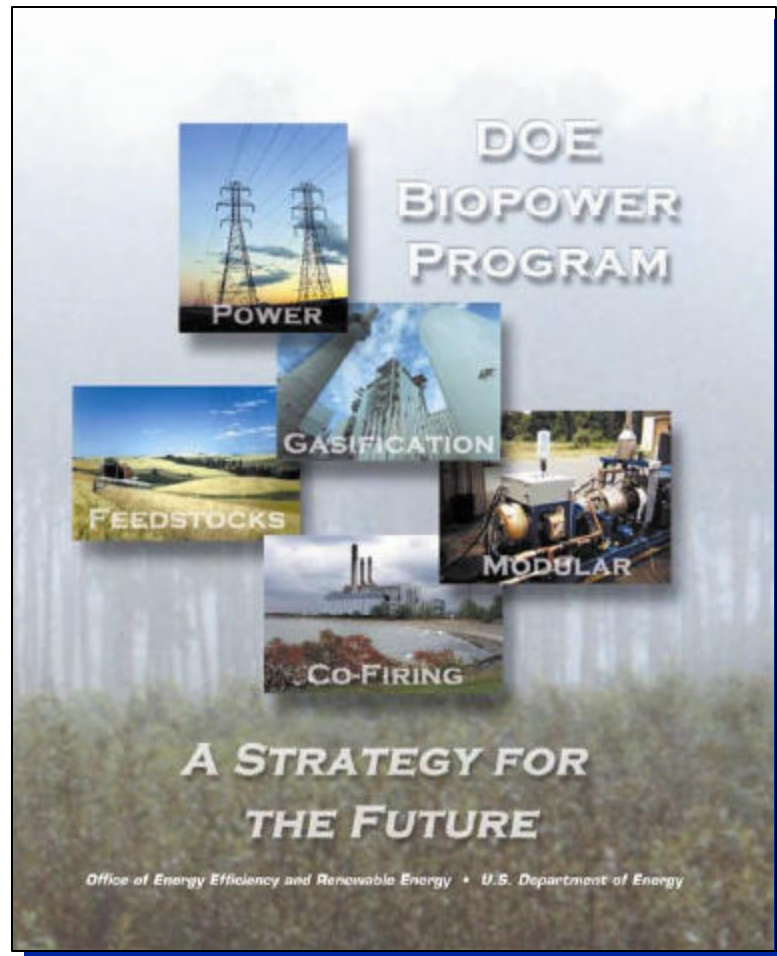


- **DOE Biopower Program Efforts In the Federal and Public Sector**



DOE Biopower Program Mission

- In partnership with industry, the Biopower Program will assist in the development and utilization of biopower technologies that are clean, reliable, and competitive with conventional power systems





FY 2001 Funding

Program Element	FY01 Enacted (\$k)
Thermochemical Conversion	3,400
Systems Development	25,965
Feedstock Production	3,300
Regional Biomass Energy Program	1,335
Bioenergy Initiative	6,000
Total	40,000



Biopower Technologies



- **Near Term:**
 - **Co-firing**
- **Mid Term:**
 - **Modular Systems**
- **Long Term:**
 - **Gasification Systems**

Co-Firing

- Biomass can be substituted for up to 10% of a boiler's coal input
- Capital ranges from \$50 to \$250 per kilowatt of biomass capacity
- Enough coal plants located close enough to a biomass source to produce up to 7,000 MWe





Distributed Generation/ Modular Systems

- Increased interest in distributed generation
- Power range from 5 kW to 5 MWe
 - Mix of technologies including microturbines, Stirling engines, fuel cells, and gasifiers





Modular Systems at Federal Facilities

- **Camp Lejeune, NC**
 - 1 MWe; Atmospheric Fluidized Bed gasifier
 - Wood residues
- **USDA Research Facility, Beltsville, MD**
 - 30 kW turbine; anaerobic digestion
 - Cow manure



Gasification

- **Gasification is a technique for converting biomass into a synthesis gas**
- **Gasification systems under development today have efficiencies approaching 40% – nearly twice that of older steam-boiler power plants**
- **Initial plants cost around \$2,000 per kW but expected to drop to \$1,400 by 2010**





Potential in Federal Sector

- It has been estimated that under an aggressive program, the Federal government could generate 30% of its electricity requirements from biobased sources by 2010

Source: “Report to the President of the United States -- In Response to Executive Order 13134: Developing and Promoting Biobased Products and Bioenergy, Prepared by the U.S. Departments of Energy and Agriculture, 2000.



- **Upcoming Events in Biopower and Information Resources**



Upcoming Biopower Events

- **5th International Biomass Conference of the Americas**
 - September 17-21, 2001, Orlando, Florida
- **12th European Conference and Technology Exhibition on Biomass for Energy, Industry, and Climate Protection**
 - June 17-21, 2002, Amsterdam, The Netherlands

